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SEM OBSERVATIONS ON THE PROTOCONCHS OF SOME MEDITERRANEAN RANELLIDAE (GASTROPODA: TONNOIDEA). (***)

KEY WORDS: Ranellidae, *Cabestana, Charonia, Cymatium,* protoconchs, systematics

Summary

In recent years several papers on the protoconch morphology of several species of the family Ranellidae have been published. However, up to now data on the Mediterranean species are lacking.

In this paper the protoconchs of Mediterranean *Cabestana cutacea cutacea, Cymatium (Monoplex) corrugatum corrugatum* and *Charonia tritonis variegata* are described and figured for the first time. The morphological analysis shows that the former two species have larval shells with very similar sculpture, but with different shape, while *C. tritonis variegata* has dissimilar features.

We conclude that the protoconchs of the studied Mediterranean species are rather well distinguishable among them, and are similar to those of congeneric species. Furthermore, the data available in the literature suggest that the protoconchs are not very different among genera and subgenera of the family Ranellidae.

Riassunto

In anni recenti sono stati pubblicati alcuni lavori sulla morfologia della protoconca di varie specie della famiglia Ranellidae. Tuttavia, mancano a tutt'oggi dati sulle specie mediterranee.

Nel presente lavoro vengono descritte e raffigurate per la prima volta le protoconche di *Cabestana cutacea cutacea, Cymatium (Monoplex) corrugatum corrugatum* e *Charonia tritonis variegata* di provenienza mediterranea. L'analisi morfologica evidenzia per le prime due specie una conchiglia larvale molto simile per scultura, ma diversa per forma, mentre *C. tritonis variegata* presenta caratteri differenti.

Si conclude che le protoconche delle specie mediterranee esaminate sono abbastanza ben distinguibili tra loro, e simili a quelle delle specie congeneri. I dati disponibili in letteratura indicano che le protoconche sono poco variabili tra i generi e sottogeneri della famiglia Ranellidae.

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Introduction

In recent years studies on larval shells have provided important contributions to several branches of molluscan biology, such as zoogeography, ecology, palaeontology, reproduction, systematics, and evolution (Thorson, 1950; Scheltema, 1971, 1986, 1989; Robertson, 1974; Shuto, 1974; Beu, 1976; Jablonski & Lutz, 1980, 1983; Richter, 1984; Jablonski, 1985; Sabelli & Tommasini, 1988).

The descriptions of larvae and protoconchs certainly identified in the family Ranellidae Gray, 1854 (= Cymatiidae Iredale, 1913) were performed by Kesteven (1901, 1902), Lebour (1945), Clench & Turner (1957), Barnard (1963), Scheltema (1966, 1971), Beu (1978, 1987), Laursen (1981), Beu & Cernohorsky (1986), Beu & Knudsen (1987), Beu & Kay (1988), and Warén & Bouchet (1990). These descriptions are of species from the Atlantic and the Indo-Pacific, whereas data from Mediterranean species are lacking.

This paper represents a contribution to the knowledge of the protoconchs of some Mediterranean Ranellidae, namely *Cabestana cutacea cutacea* (L., 1767), *Cymatium (Monoplex) corrugatum corrugatum* (Lamarck, 1816), and *Charonia tritonis variegata* (Lamarck, 1816).

Explanation of figures

Fig. 1. *Cabestana cutacea cutacea*: protoconch, apical view (scale bar = 0.5 mm).

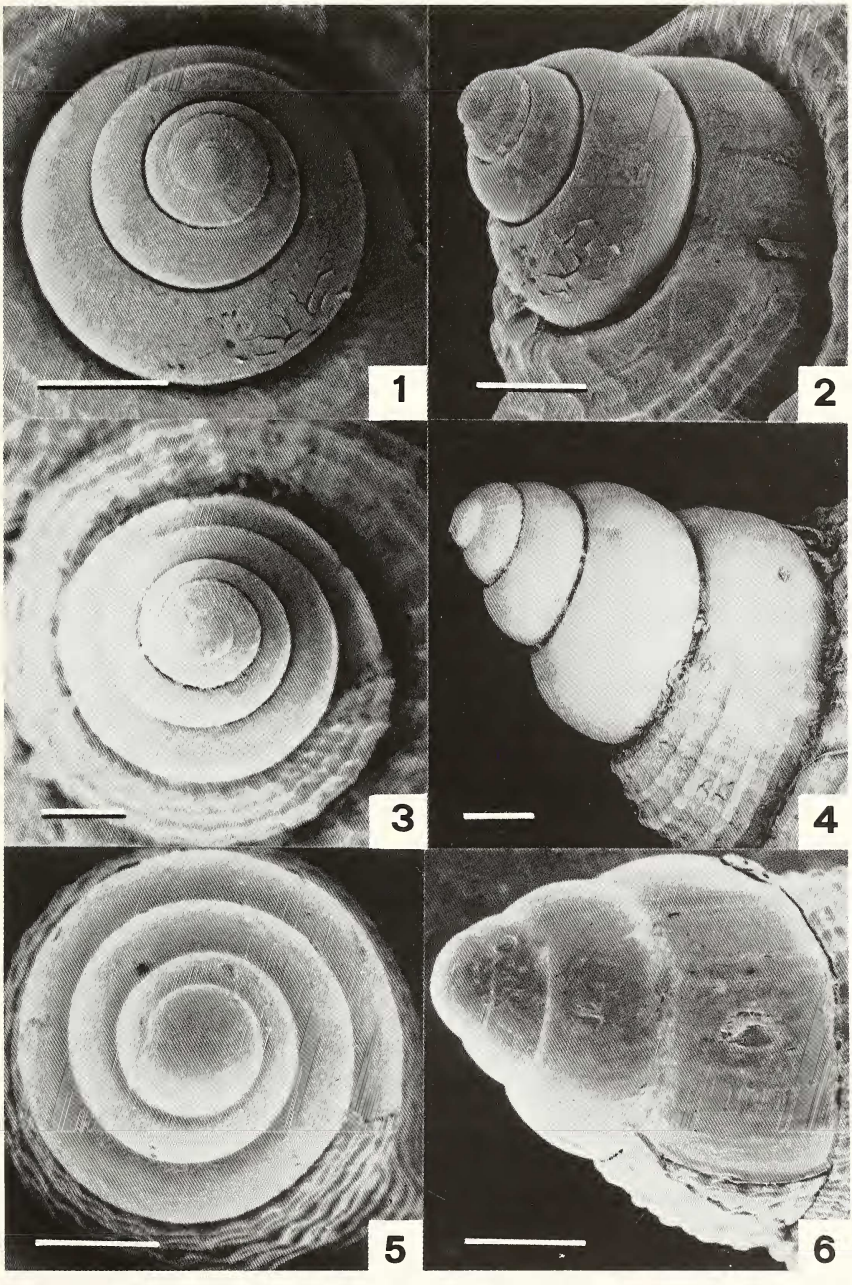
Fig. 2. *Cabestana cutacea cutacea*: protoconch, lateral view (scale bar = 0.5 mm).

Fig. 3. *Cymatium (Monoplex) corrugatum corrugatum*: protoconch, apical view (scale bar = 1 mm).

Fig. 4. *Cymatium (Monoplex) corrugatum corrugatum*: protoconch, lateral view (scale bar = 1 mm).

Fig. 5. *Charonia tritonis variegata*: protoconch, apical view (scale bar = 1 mm).

Fig. 6. *Charonia tritonis variegata*: protoconch, lateral view (scale bar = 1 mm).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Material and methods

One of the difficulties in protoconch studies consists of finding suitable material in sufficient numbers, since the ranellids are uncommon and rather difficult to collect, particularly with complete protoconchs.

We studied the following species: *C. cutacea cutacea* (4 individuals from the Bay of Naples, Italy), *C. (M.) corrugatum corrugatum* (6 individuals from the Bay of Naples, Italy), and *C. tritonis variegata* (3 individuals from Famagusta, Cyprus). The material was obtained from fishing-nets and by scuba-diving, and was preserved in 70° alcohol or dried. After sorting by stereomicroscope, the specimens were placed in 5% sodium hypochlorite to remove the periostracum, cleaned by ultra-sound at 50 KHz for 2-3 min, then coated with gold, and finally examined and photographed using a SEM Cambridge Stereoscan 250.

The systematic nomenclature follows Beu (1985) and the protoconch terminology follows Taylor (1975), Beu (1987), and Beu & Kay (1988).

Results

As in most Ranellidae, the studied species have larvae that are typically planktotrophic, of the type known as teleplanic (Scheltema, 1971), their protoconchs being made up of a small embryonic chamber (protoconch I) and a multispiral larval shell (protoconch II) (Jablonski & Lutz, 1980; Jablonski, 1985).

All the examined protoconchs reach $4^1/_2$ whorls, $1^1/_4$ of which belonging to the embryonic chamber.

C. cutacea cutacea (figs. 1, 2) and *C. (M.) corrugatum corrugatum* (figs. 3, 4) have protoconchs appearing very similar as for the sculpture: their embryonic chambers are rounded with a pitted surface, while the initial 3/4 whorl of protoconch II bears a cancellate pattern consisting of about 20 axial ribs and three spiral cords; the remaining whorls are smooth; deeply impressed sutures. However, the protoconch of *C. (M.) corrugatum corrugatum* is comparatively taller and narrower (conical shape) than that of the former (turbiniform shape). *C. tritonis variegata* (figs. 5, 6) has both protoconch I and II quite smooth, and a conical shape; shallow sutures.

Discussion

Our results are in good agreement with the descriptions available in the literature.

C. cutacea cutacea is here described and figured for the first time; its protoconch has a general appearance closely resembling those of other known members of the genus *Cabestana* Roeding, 1798, being turbiniform (*C. cutacea dolaria*: Barnard, 1963; *C. spengleri*: Kesteven, 1901, 1902; Suter, 1913; *C. tabulata*: Kesteven, 1902). Our analysis shows for the first time the presence of a pitted embryonic chamber as well as a cancellate pattern in the early whorls of protoconch II.

Descriptions of the protoconch of *C. (M.) corrugatum corrugatum* have not been published previously (except for the Caribbean subspecies *C. (M.) corrugatum krebsi*, see LAURSEN, 1981); it is virtually indistinguishable from those of most representatives of the subgenus *Cymatium (Monoplex)* PERRY, 1811, in having a pitted embryonic chamber, a cancellate sculpture on the early whorls of protoconch II, and a conical shape.

The described protoconchs of *Charonia* GISTEL, 1848 (*C. lampas lampas*: KESTEVEN, 1902; Atlantic *C. tritonis variegata*: CLENCH & TURNER, 1957; SCHELTEMA, 1971; LAURSEN, 1981; *C. lampas pustulata*: BARNARD, 1963) are quite similar to that of the Mediterranean *C. tritonis variegata*; their surface is smooth and shining, and the shape is conical; the embryonic chamber is smooth.

In conclusion, our analysis shows that the protoconchs of the studied Mediterranean Ranellidae are rather well distinguishable among them, and their morphology agrees with the descriptions available in the literature. However, the data from literature concerning the whole family suggest that there are trivial differences at specific level, and a characterization at generic and subgeneric level is presently arduous, the protoconchs tending to differ little among the quoted taxa.

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